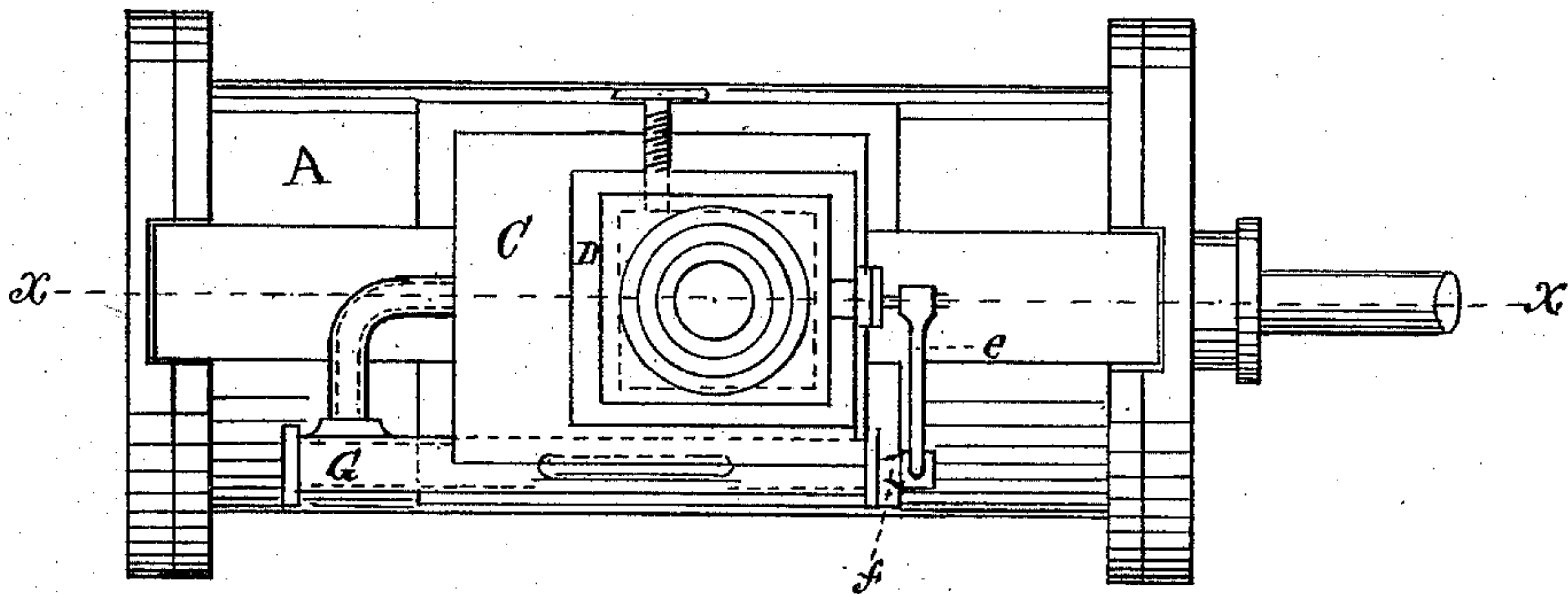
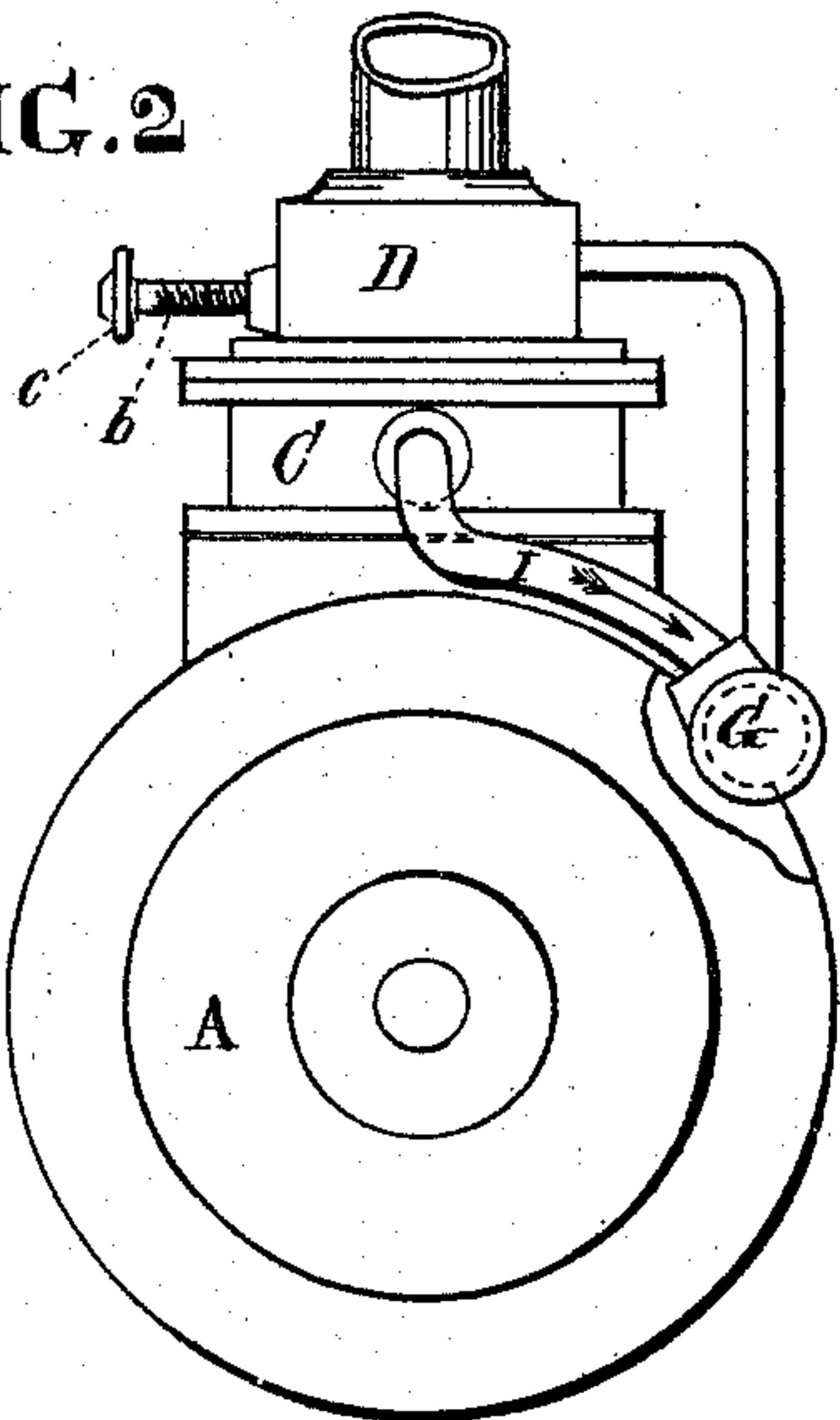


**W. S. DEEDS.**  
**Combined Throttle and Governor Valves.**  
 No. 156,414. Patented Nov. 3, 1874.

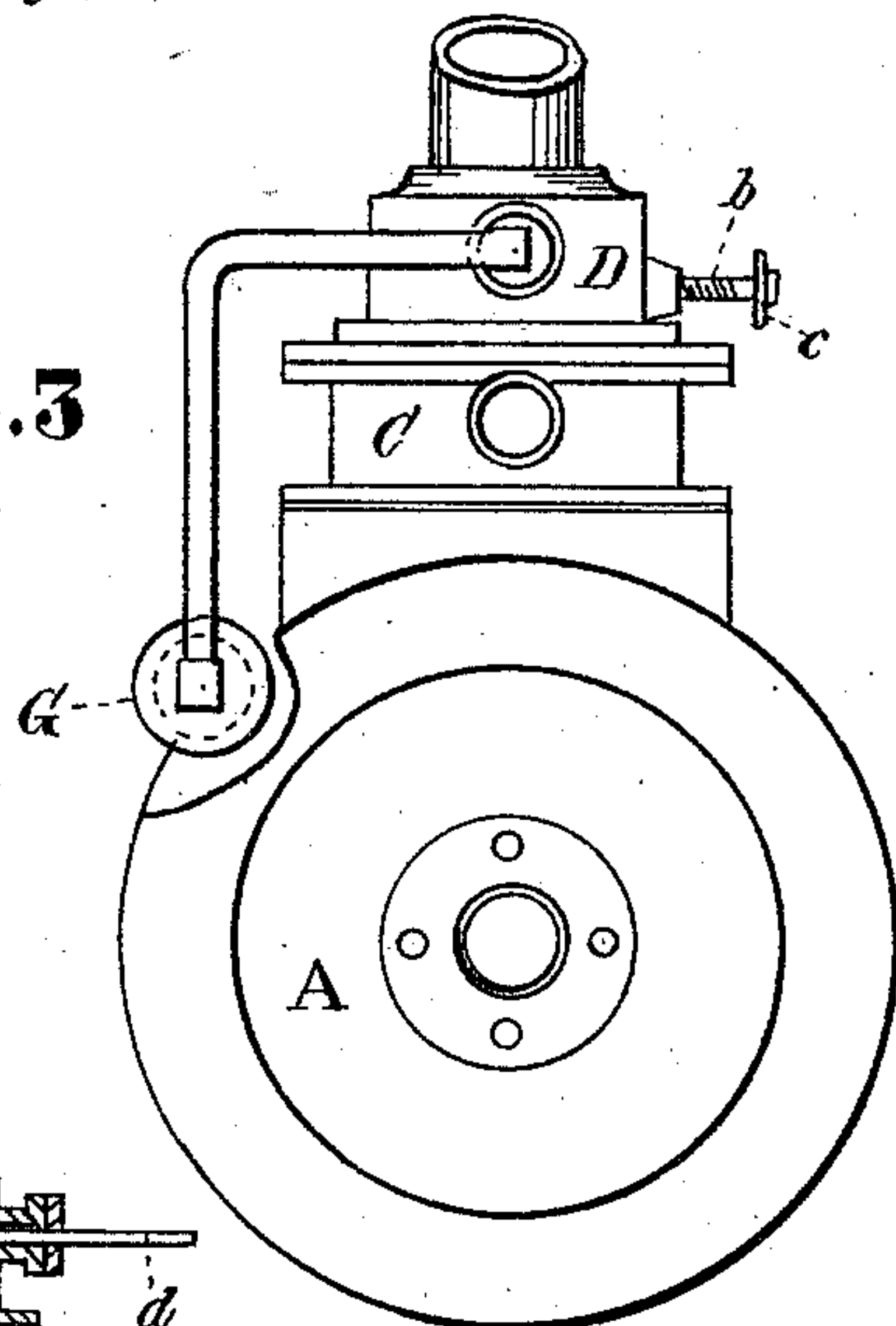
**FIG. 1**



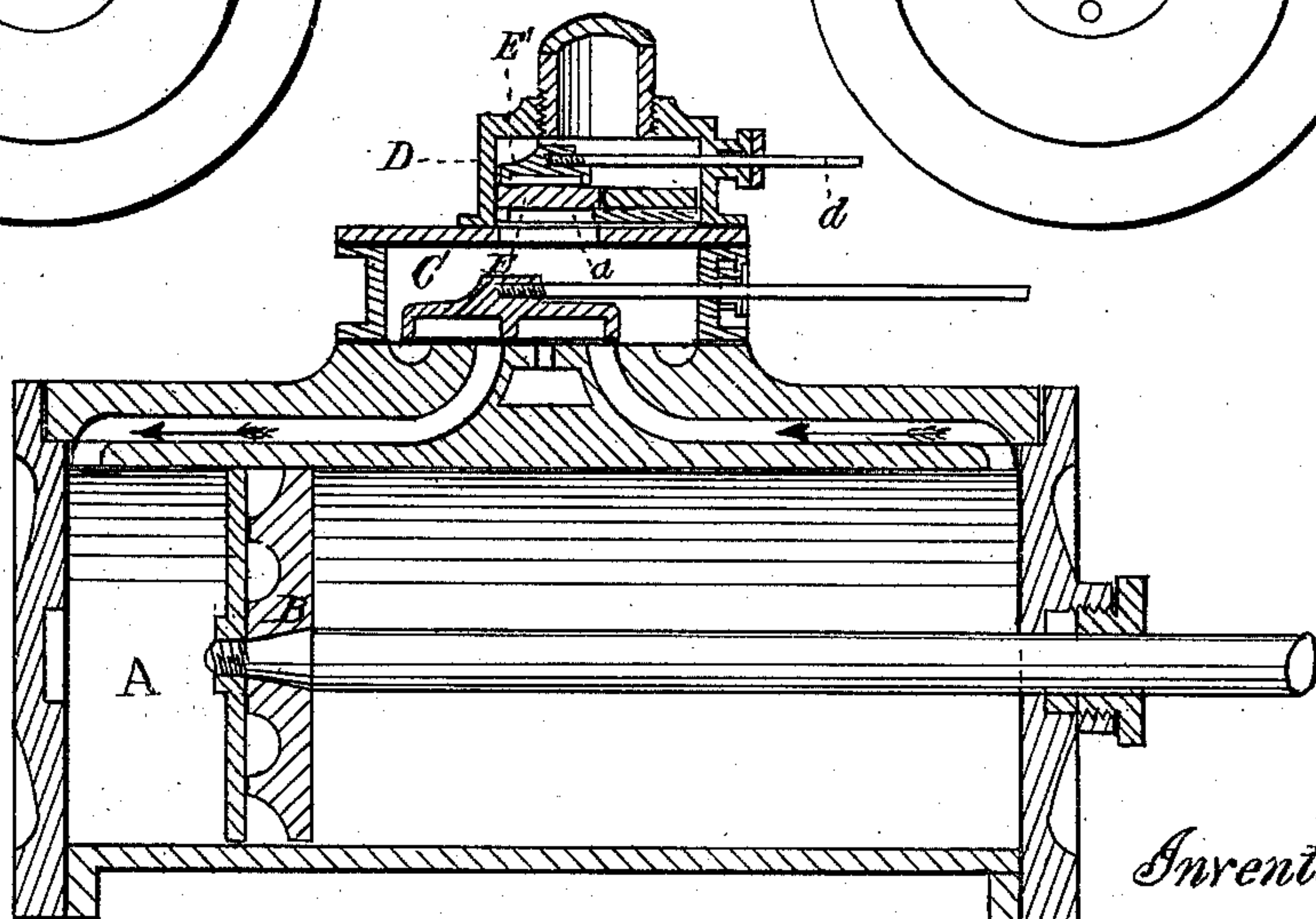
**FIG. 2**



**FIG. 3**



**FIG. 4**



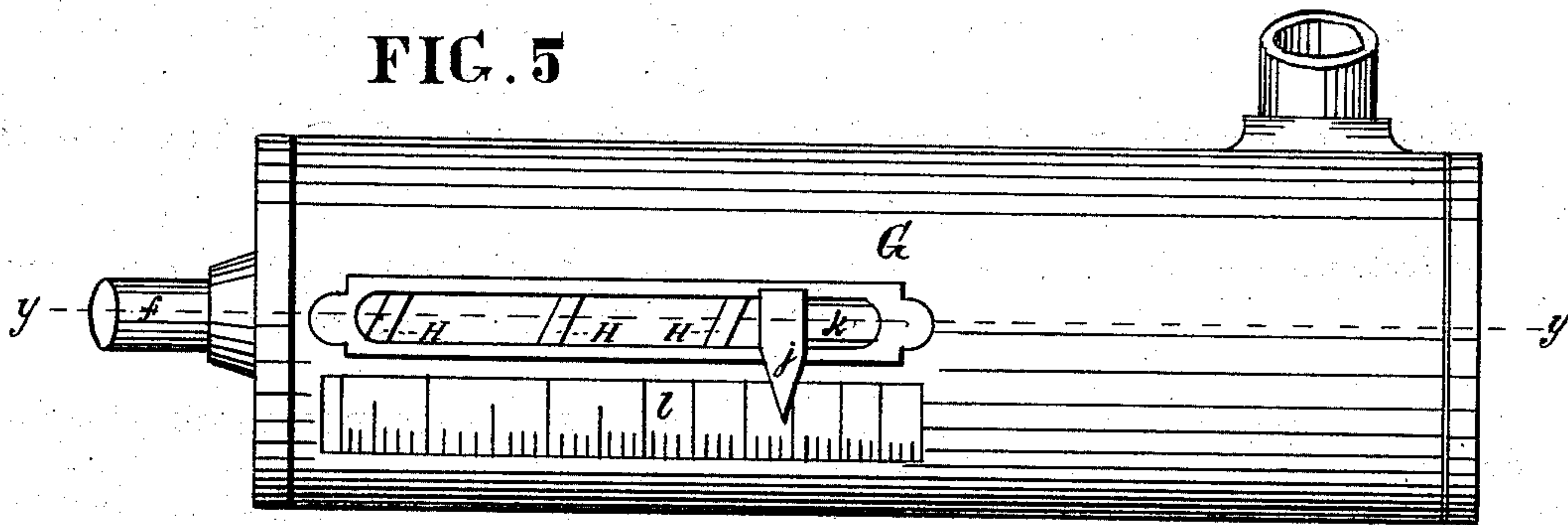
*Witnesses;*  
*Thomas J. Bewley*  
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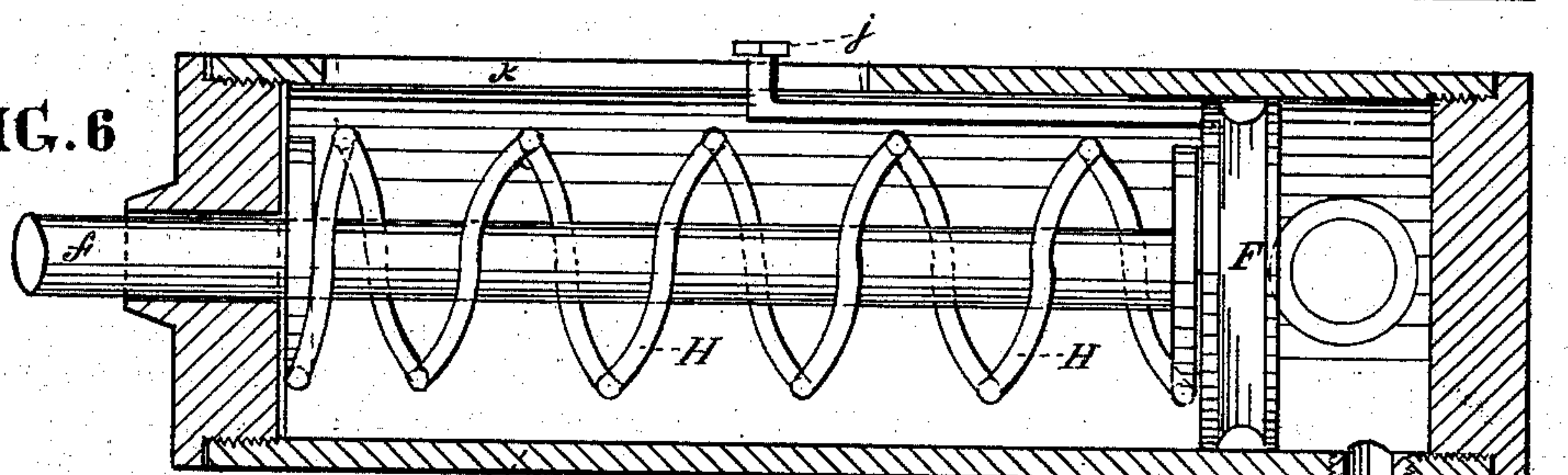


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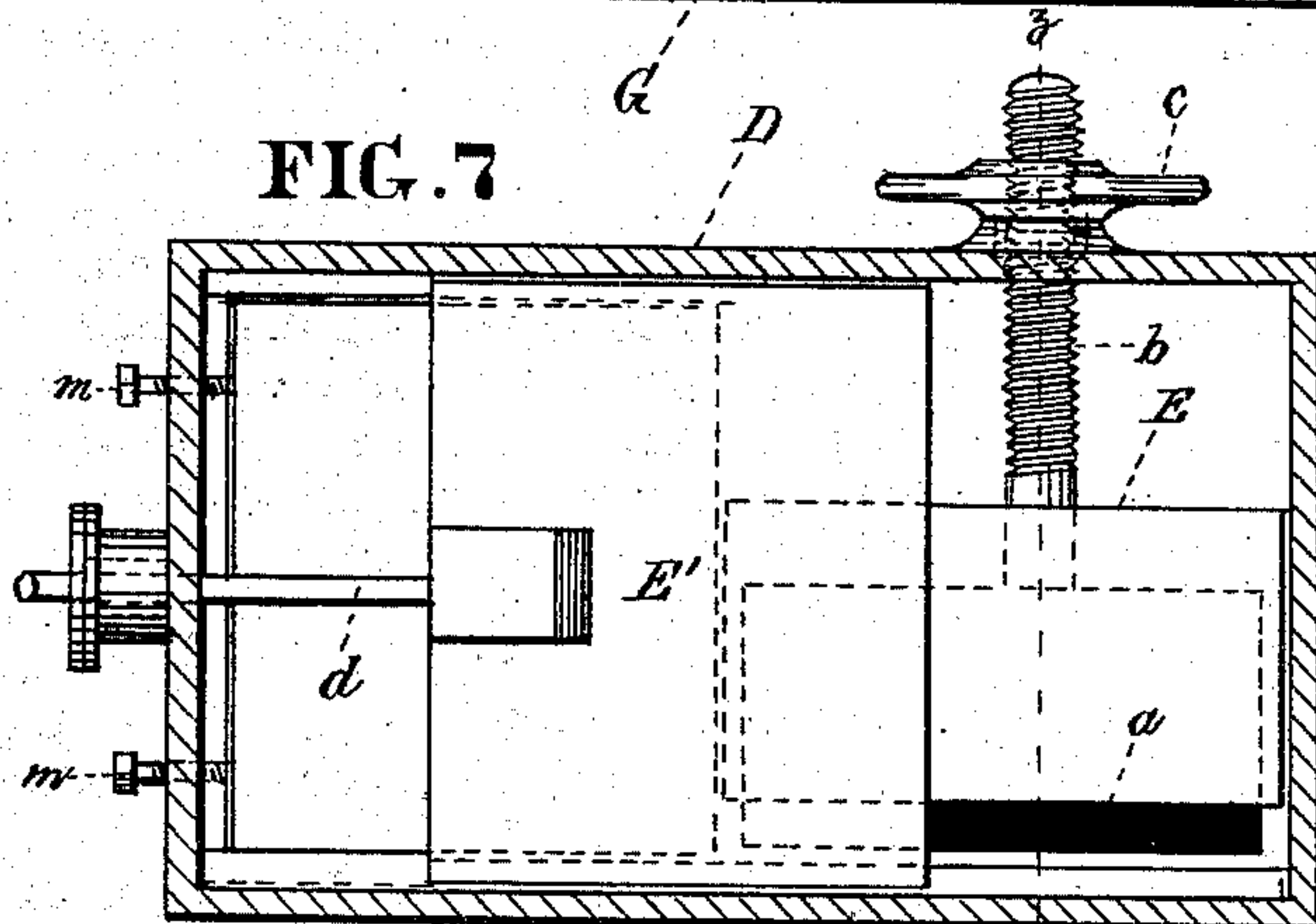
**FIG. 5**



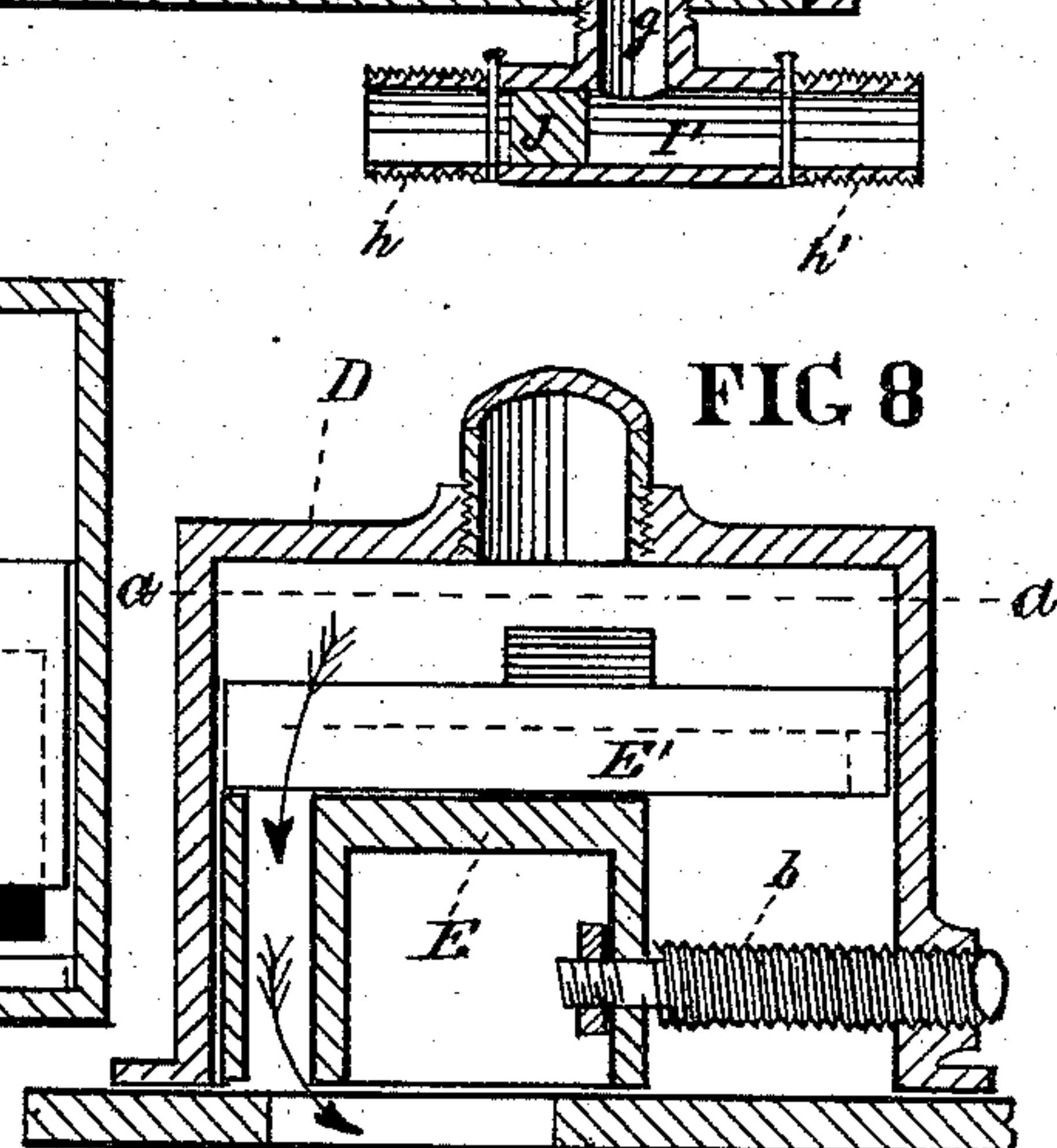
**FIG. 6**



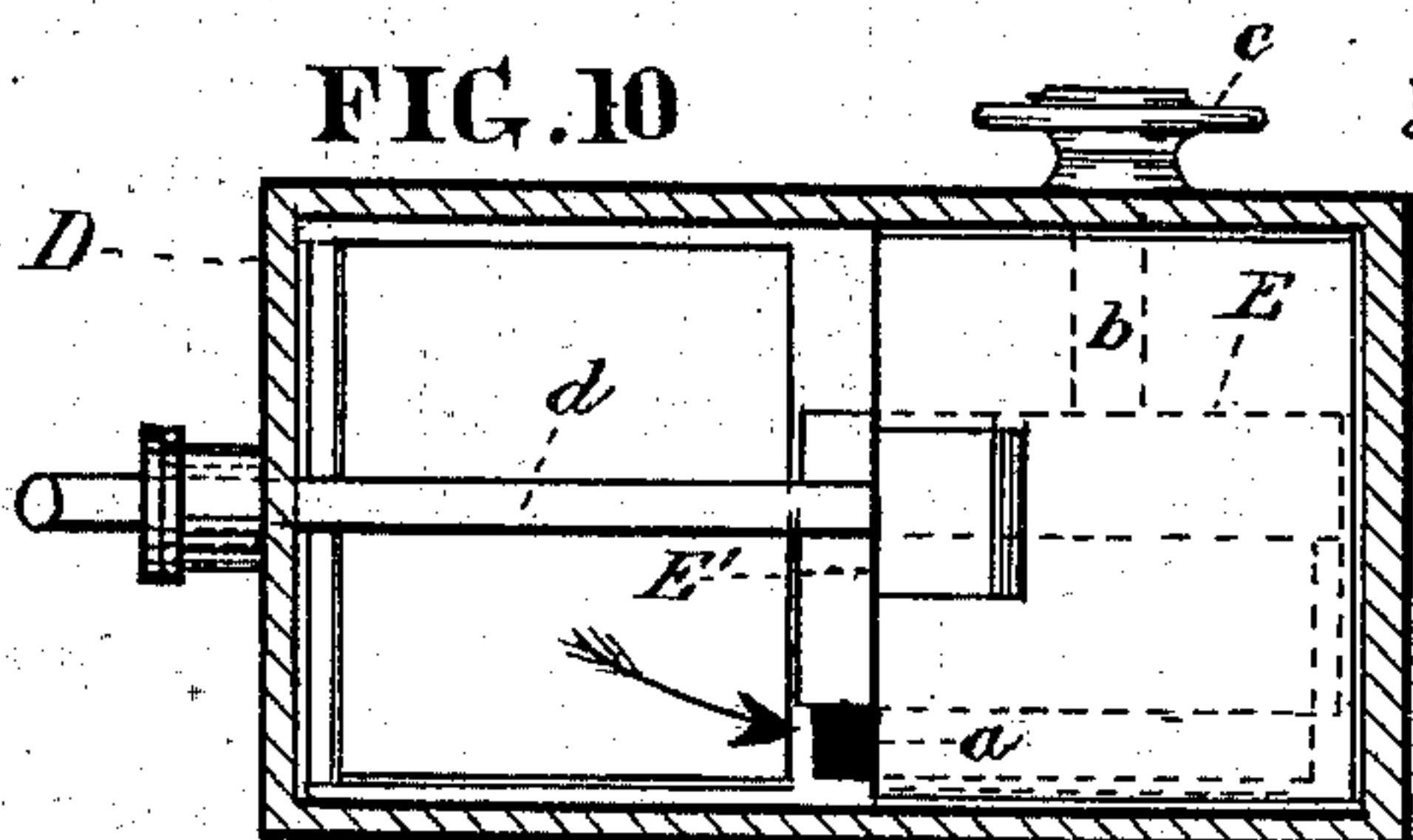
**FIG. 7**



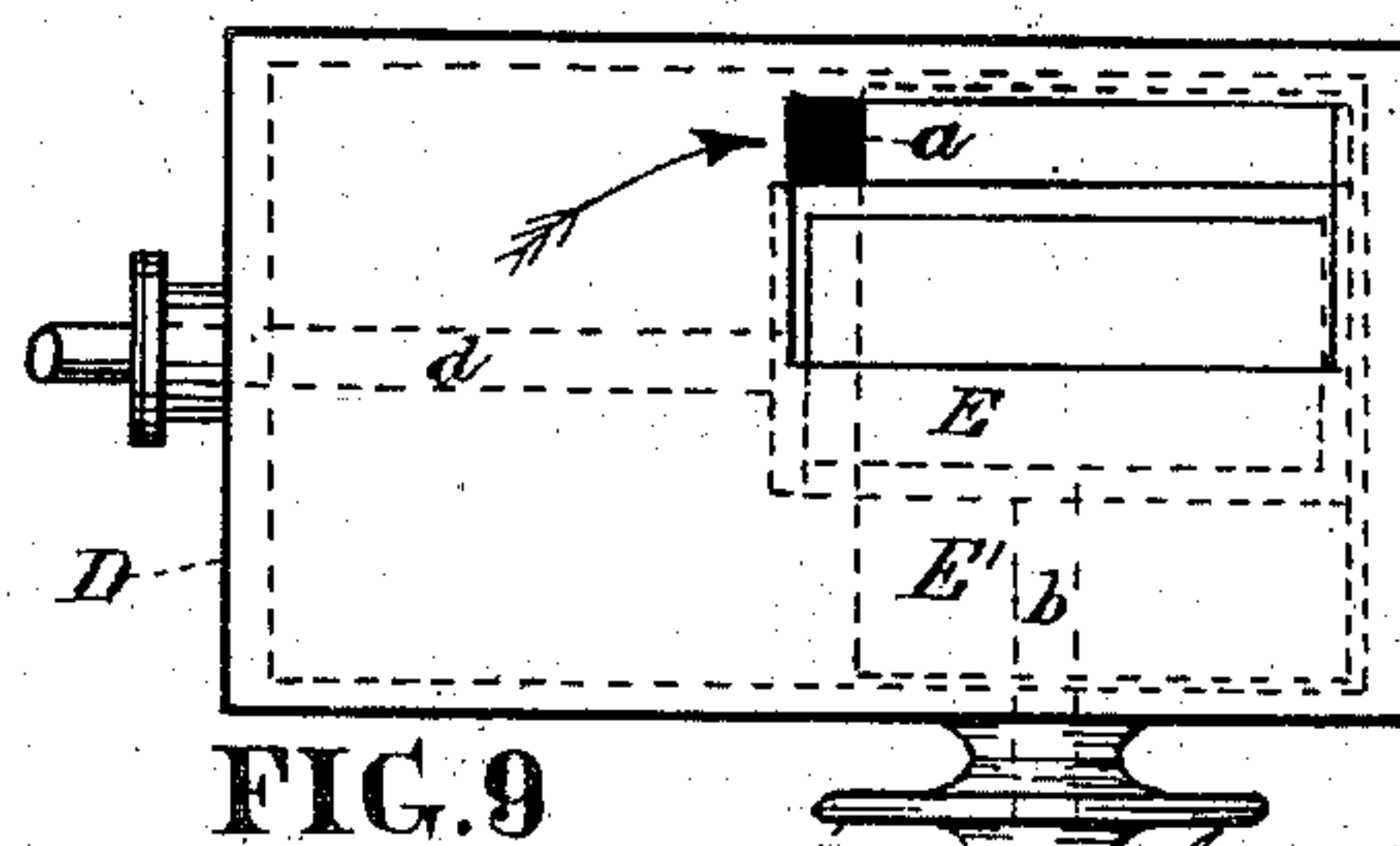
**FIG. 8**



**FIG. 10**



**FIG. 9**



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# UNITED STATES PATENT OFFICE.

WILLIAM S. DEEDS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF  
ONE-HALF HIS RIGHT TO JOSEPH LANZEL, OF SAME PLACE.

## IMPROVEMENT IN COMBINED GOVERNOR AND THROTTLE VALVES.

Specification forming part of Letters Patent No. **156,414**, dated November 3, 1874; application filed  
February 20, 1874.

*To all whom it may concern:*

Be it known that I, WILLIAM S. DEEDS, of the city and county of Philadelphia, in the State of Pennsylvania, have invented an Improvement in a Combined Governor and Throttle Valve for Steam-Engines, of which the following is a specification:

My invention relates to a combined throttle-valve and steam-governor valve, which is combined and arranged with the steam-chest of a steam-engine, in such a manner that the admission of steam to the steam-chest is regulated according to the required speed of the engine. In the said combination there is a valve-box, provided with two slide-valves, which move in different horizontal planes and at right angles to each other, the lower side of the upper one moving against the upper side of the lower one. The valves are so arranged in the box that the pressure of the steam keeps them steam-tight against each other and against their seats. The lower valve is for the double purpose of admitting steam to the engine in starting and stopping it, and of regulating by hand the width of the port, in the bottom of the box, (which connects with the steam-chest,) in one direction, while the upper valve moves automatically to open the port in the other direction by means of its connection with a piston in a small cylinder, which has a steam-passage, which leads from the steam-chest of the engine, whereby the said piston is moved in one direction by the pressure of the steam, at the same time contracting a spring, which carries the piston back when the pressure of steam falls to a lower point or is withdrawn, the pressure of the steam varying according to the speed of the piston of the engine.

The main object of the two valves moving in different planes and at right angles to each other is for the purpose of varying the width or area of the port, which the movement of the piston of the governor opens by operating the upper valve, according to the different pressures of the steam with which the engine is run, thereby obtaining the same speed of the engine, when steam of a higher or lower pressure is used, by merely manipulating the hand-wheel, with which the lower valve is connected

by means of a screw-stem, which manipulation can be done in a moment while the engine is running. Another object is, changing the width of the port according to any change in the amount or extent the governor moves under the same steam-pressure, (which change may take place when the spring varies in its resistance from long use or other circumstances,) and when the movement of the governor-piston becomes altered by means of increase or diminution of the friction of the valves and other parts of the governor, it being only necessary to open the lower valve more, and make the width of the port greater when the governor-piston moves the upper valve the least, and to close it more and make the width of the port less in the one direction when the governor-piston moves the upper valve the most, under the same steam-pressure.

In the accompanying drawings, Figure 1 is a plan view of the cylinder of a steam-engine with my improvements attached. Fig. 2 is an elevation of the rear end of the cylinder. Fig. 3 is an elevation of its front end. Fig. 4 is a vertical longitudinal section at the line *x x* of Fig. 1. Fig. 5, Sheet No. 2, is a plan view of the small cylinder G on an enlarged scale. Fig. 6 is a vertical longitudinal section at the line *y y* of Fig. 5. Fig. 7 is a horizontal section of the valve-case D, also on an enlarged scale, the upper side of the case being removed for the purpose of showing its interior. Fig. 8 is a cross-section at the line *z z* of Fig. 7. Fig. 9 is a reverse plan view of the case D on a smaller scale than Figs. 7 and 8. Fig. 10 is a horizontal section taken at the line *a a* of Fig. 8, showing a different position of the valves.

Like letters of reference in all the figures indicate the same parts.

A is the cylinder of a steam-engine; B, the piston, and C the steam-chest, all of ordinary construction. Therefore, a particular description of the same is omitted. D is a valve-case, which is bolted to the top of the steam-chest C, and communicates therewith by means of the port *a*, as shown in Fig. 4. Said case is provided with valves E and E', which move in different horizontal planes, and at right angles to each other, for decreasing or increas-



ing the area of the port *a*. The lower valve *E* is adjusted by means of the screw-stem *b*, having a hand-wheel, *c*, for its manipulation, according to the speed required and the pressure of the steam in the boiler. The upper valve *E'* has a rod, *d*, which is connected by means of the cross-head *e* with the rod *f* of the piston *F* of the small cylinder *G*, by which an automatic adjustment is given to the valve *E'* by virtue of the pressure exerted by the steam upon one side of the piston, and a regulating counteracting pressure of the spring *H* on its other side. The steam is represented in Figs. 1 and 2 as passing from the steam-chest *C* through pipe-connection *I*. In some engines, and under certain circumstances, it may be better to connect the governor-cylinder *G* directly with the engine-cylinder *A*, in order to have the steam in said cylinder to operate the governor-piston *F*, instead of the steam in the steam-chest. For this purpose the cylinder *G* is provided with a pipe or small cylinder, *I'*, as represented in Fig. 6, having a pipe-connection, *g*, with the cylinder *G*, and containing a valve, *J*, and having the screw-threaded connections *h* and *h'*; the purpose of which device is to connect the cylinder *G* with both ends of the steam-cylinder *A* of the engine, so as to operate the piston *F* of the cylinder *G* by the steam in the cylinder *A* of the engine, instead of taking it from the steam-chest, or any passage between the steam-cylinder and steam-chest.

Lateral pipes of the length required can be connected with the ends of the steam-cylinder and the screw-threaded connections *h* *h'*, whereby the pressure of the steam will change the position of the valve *J* to the right and left of the pipe *g*, so that the exhaust end of the steam-cylinder will not communicate with the cylinder *G*, and so that the communication of each end of the steam-cylinder *A* with that of the cylinder *G* will be open alternately, according as either end is taking in or exhausting steam.

The piston *F* is provided with an index-hand, *j*, which has a longitudinal movement in the slot *k* of the cylinder, and there is a scale, *b*, at one or both sides of the slot, whereby the pressure of the steam in the cylinder is determined, for the purpose of regulating the pressure of steam in the boiler. The governor-cylinder *G* may be situated in any convenient place on the engine, suitable pipes, according to its position, being used for connection with the engine-cylinder, the rod *f* of the piston *F* being provided with levers, cranks, and other connections, depending upon the connection of this cylinder with the throttle-valve case *D*. For this purpose I construct the governor-cylinder in the manner shown in Fig. 6.

In starting the engine, the upper valve, *E'*, being shorter than the lower valve, *E*, when the lower valve is open the steam is admitted back of the valve *E'*, as indicated by the arrow in Fig. 10, to admit steam, which will operate the piston *F*, to push the valve *E'* to the extent required, according to the speed required for the engine to run. The steam-pressure per square inch upon the piston *F* of the governor-cylinder *G* being equal to the pressure per square inch upon the piston *B* of the engine-cylinder, the valves *E* and *E'* are so adjusted as to admit of the passage of the requisite amount of steam through the port *a* at a given pressure to run the engine carrying a certain load. If, now, the load upon the engine be increased, more pressure will be required upon the engine-piston to overcome the increase of the load and maintain the former rate of speed; and as the port *a* was opened just large enough to admit the amount of steam required to produce the speed with the small load, the speed of the piston is arrested in proportion to the increase of the load, whereby more time is given for the steam to enter through the port, and the pressure of the steam rises, whereby the valve opens the port until it admits enough steam to produce the speed with the additional load. On the other hand, if the load on the engine is diminished while the engine is in motion, the pressure of the steam below the throttle-valve is thereby diminished, because the piston-speed of the engine is accelerated in proportion to the diminution of the load, and the steam has less time to enter through the port of the throttle-valve. The spring *H* on the piston-rod *f* carries the governor-piston *F* back in proportion to the diminished pressure of the steam below the throttle-valve and the increase of speed of the engine-piston *B*, thereby maintaining a uniform rate of speed of the piston under different loads of the engine.

The screws *m m* (seen in Fig. 7) are for the purpose of keeping the seat of the valve *E'* pressed up against the valve *E* as a guide.

I claim as my invention—

1. The combination of the valves *E* and *E'*, moving in different horizontal planes, and at right angles to each other, with the case *D* and steam-chest *C*, substantially as described.
2. The combination of the cylinder *G*, having a piston, *F*, spring *H*, and steam-pipe connection *I*, with the steam-chest *C* of a steam-engine, and with the valve-case *D*, having a valve, *E*, adjustable by means of a screw, and a valve, *E'*, substantially in the manner and for the purpose set forth.

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Witnesses:

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